




# FCC REPORT

**Report No.** ..... : **CHTEW20080145** Report verification: 

**Project No.** ..... : **SHT2005099309EW**

**FCC ID**..... : **2ANY6-TE590P**

**Applicant's name**..... : **Telo Systems Ltd.**

**Address**..... : **6/F, No.42 Liuxian 1st Road, Bao'an District, Shenzhen, China**

**Manufacturer**..... : **Telo Systems Ltd.**

**Address**..... : **6/F, No.42 Liuxian 1st Road, Bao'an District, Shenzhen, China**

**Test item description** ..... : **Smart Phone**

**Trade Mark** ..... : **Telo Systems**

**Model/Type reference**..... : **TE590P**

**Listed Model(s)** ..... : **TE590PLUS**


**Standard** ..... : **FCC CFR Title 47 Part 2**  
**FCC CFR Title 47 Part 90**

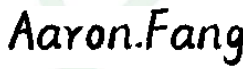
**Date of receipt of test sample**..... : **Jun.30, 2020**


**Date of testing**..... : **Jun.30, 2020- Aug.17, 2020**

**Date of issue**..... : **Aug.18, 2020**

**Result**..... : **Pass**

Compiled by  
 ( position+printedname+signature)....: File administrators Fanghui Zhu 

Supervised by  
 (position+printedname+signature)....: Project Engineer Aaron Fang 

Approved by  
 (position+printedname+signature)....: Manager Hans Hu 

**Testing Laboratory Name** ..... : **Shenzhen Huatongwei International Inspection Co., Ltd.**

**Address**..... : **1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China**

**Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.**

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

*The test report merely correspond to the test sample.*

## Contents

|           |   |           |
|-----------|---|-----------|
| <b>1.</b> | <b><u>TEST STANDARDS AND REPORT VERSION</u></b>       | <b>3</b>  |
| 1.1.      | Applicable Standards                                  | 3         |
| 1.2.      | Report version information                            | 3         |
| <b>2.</b> | <b><u>TEST DESCRIPTION</u></b>                        | <b>4</b>  |
| <b>3.</b> | <b><u>SUMMARY</u></b>                                 | <b>5</b>  |
| 3.1.      | Client Information                                    | 5         |
| 3.2.      | Product Description                                   | 5         |
| 3.3.      | Operation state                                       | 5         |
| 3.4.      | EUT operation mode                                    | 6         |
| 3.5.      | EUT configuration                                     | 6         |
| 3.6.      | Modifications   | 6         |
| <b>4.</b> | <b><u>TEST ENVIRONMENT</u></b>                        | <b>7</b>  |
| 4.1.      | Address of the test laboratory                        | 7         |
| 4.2.      | Test Facility   | 7         |
| 4.3.      | Equipments Used during the Test                       | 8         |
| 4.4.      | Environmental conditions                              | 9         |
| 4.5.      | Statement of the measurement uncertainty              | 9         |
| <b>5.</b> | <b><u>TEST CONDITIONS AND RESULTS</u></b>             | <b>10</b> |
| 5.1.      | Conducted Output Power                                | 10        |
| 5.2.      | Peak-to-Average Ratio                                 | 11        |
| 5.3.      | 99% Occupied Bandwidth & 26 dB Bandwidth              | 12        |
| 5.4.      | Band Edge   | 13        |
| 5.5.      | Conducted Spurious Emissions                          | 14        |
| 5.6.      | Frequency stability VS Temperature measurement        | 15        |
| 5.7.      | Frequency stability VS Voltage measurement            | 16        |
| 5.8.      | ERP   | 17        |
| 5.9.      | Radiated Spurious Emission                            | 20        |
| <b>6.</b> | <b><u>TEST SETUP PHOTOS OF THE EUT</u></b>            | <b>24</b> |
| <b>7.</b> | <b><u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u></b> | <b>24</b> |
| <b>8.</b> | <b><u>APPENDIX REPORT</u></b>                         | <b>24</b> |

# **1. TEST STANDARDS AND REPORT VERSION**

## **1.1. Applicable Standards**

The tests were performed according to following standards:

[FCC Rules Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Rules Part 90](#): PRIVATE LAND MOBILE RADIO SERVICES.

[ANSI C63.26: 2015](#): American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[KDB 971168 D01 Power Meas License Digital Systems v03](#): MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

## **1.2. Report version information**

| Revision No. | Date of issue | Description |
|--------------|---------------|-------------|
| N/A          | 2020-08-18    | Original    |
|              |               |             |
|              |               |             |
|              |               |             |
|              |               |             |

## **2. Test Description**

| <b>Test Item</b>                         | <b>Section in CFR 47</b>            | <b>Result</b> | <b>Test Engineer</b> |
|--|-------------------------------------|---------------|----------------------|
| Conducted Output Power                   | Part 2.1046<br>Part 90.635(b)       | Pass          | Jiongsheng Feng      |
| Peak-to-Average Ratio                    | -                                   | Pass          | Jiongsheng Feng      |
| 99% Occupied Bandwidth & 26 dB Bandwidth | Part 2.1049                         | Pass          | Jiongsheng Feng      |
| Band Edge                                | Part 2.1051<br>Part 90.691          | Pass          | Jiongsheng Feng      |
| Conducted Spurious Emissions             | Part 2.1051<br>Part 90.691          | Pass          | Jiongsheng Feng      |
| Frequency stability VS Temperature       | Part 2.1055(a)(1)(b)<br>Part 90.213 | Pass          | Jiongsheng Feng      |
| Frequency stability VS Voltage           | Part 2.1055(d)(1)(2)<br>Part 90.213 | Pass          | Jiongsheng Feng      |
| ERP                                      | Part 22.913(a)<br>Part 90.635(b)    | Pass          | Pan Xie              |
| Radiated Spurious Emissions              | Part 2.1053<br>Part 90.691          | Pass          | Pan Xie              |

Note: The measurement uncertainty is not included in the test result.

### 3. SUMMARY

#### 3.1. Client Information

|               |   |
|---------------|---|
| Applicant:    | Telo Systems Ltd.   |
| Address:      | 6/F, No.42 Liuxian 1st Road, Bao'an District, Shenzhen, China |
| Manufacturer: | Telo Systems Ltd.   |
| Address:      | 6/F, No.42 Liuxian 1st Road, Bao'an District, Shenzhen, China |

#### 3.2. Product Description

|                     |   |
|---------------------|---|
| Name of EUT:        | Smart Phone                                     |
| Trade Mark:         | Telo Systems                                    |
| Model No.:          | TE590P  |
| Listed Model(s):    | TE590PLUS                                       |
| SIM Information:    | Support One SIM Card                            |
| Power supply:       | DC 3.8V   |
| Hardware version:   | TD058_MB_V2.0_20191224                          |
| Software version:   | TE590P_SIN_V1_20200810                          |
| <b>4G</b>           |   |
| Operation Band:     | <input checked="" type="checkbox"/> FDD Band 26 |
| Transmit frequency: | 814.7 MHz – 823.3 MHz                           |
| Receive frequency:  | 859.7 MHz – 868.3 MHz                           |
| Channel bandwidth:  | 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz                |
| Power Class:        | Class 3   |
| Modulation type:    | QPSK, 16QAM                                     |
| Antenna type        | PIFA  |
| Antenna Gain        | 1.21dBi   |

#### 3.3. Operation state

##### ➤ Test frequency list

|             |                   |               |                 |                           |                 |                             |
|-------------|-------------------|---------------|-----------------|---------------------------|-----------------|-----------------------------|
| TDD Band 26 | Test Frequency ID | Banwidth[MHz] | N <sub>UL</sub> | Frequency of Uplink [MHz] | N <sub>DL</sub> | Frequency of Downlink [MHz] |
|             | Low Range         | 1.4           | 26997           | 814.7                     | 8697            | 859.7                       |
|             |                   | 3             | 26705           | 815.5                     | 8705            | 860.5                       |
|             |                   | 5             | 26715           | 816.5                     | 8715            | 861.5                       |
|             |                   | 10            | -               | -                         | -               | -                           |
|             | Mid Range         | 1.4/3/5/10    | 26740           | 819                       | 8740            | 864                         |
|             | High Range        | 1.4           | 26783           | 823.3                     | 8783            | 868.3                       |
|             |                   | 3             | 26775           | 822.5                     | 8775            | 867.5                       |
|             |                   | 5             | 26765           | 821.5                     | 8765            | 866.5                       |
|             |                   | 10            | -               | -                         | -               | -                           |

### 3.4. EUT operation mode

For RF test items

The EUT has been tested under typical operating condition. Testing was performed by configuring EUT to maximum output power status.

| Test Items                               | Band  | Bandwidth (MHz) |   |   |    |    | Modulation |       | RB # |      |      |
|--|---|-----------------|---|---|----|----|------------|-------|------|------|------|
|  |   | 1.4             | 3 | 5 | 10 | 15 | QPSK       | 16QAM | 1    | Half | Full |
| Conducted Output Power                   | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | ○    | ○    | ○    |
| Peak-to-Average Ratio                    | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | ○    | -    | ○    |
| 99% Occupied Bandwidth & 26 dB Bandwidth | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | -    | -    | ○    |
| Band Edge                                | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | ○    | -    | ○    |
| Conducted Spurious Emission              | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | ○    | -    | -    |
| Frequency Stability                      | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | -    | -    | ○    |
| ERP and EIRP                             | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | ○    | -    | -    |
| Radiated Spurious Emission               | 26  | ○               | ○ | ○ | ○  | ○  | ○          | ○     | ○    | -    | -    |
| <b>Remark</b>                            | 1. The mark "○" means that this configuration is chosen for testing<br>2. The mark "-" means that this bandwidth is not test.<br>3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. |                 |   |   |    |    |            |       |      |      |      |

### 3.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

|     |               |   |
|-----|---------------|---|
| ○ / | Manufacturer: | / |
|     | Model No.:    | / |
| ○ / | Manufacturer: | / |
|     | Model No.:    | / |

### 3.6. Modifications

No modifications were implemented to meet testing criteria.

## **4. TEST ENVIRONMENT**

### **4.1. Address of the test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

### **4.2. Test Facility**

#### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

#### **IC-Registration No.:5377A**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377A.

#### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

### 4.3. Equipments Used during the Test

| Used | Test Equipment               | Manufacturer | Equipment No. | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
|------|------------------------------|--------------|---------------|-----------|------------|---------------------------|---------------------------|
| ●    | Signal and spectrum Analyzer | R&S          | HTWE0242      | FSV40     | 100048     | 2019/10/26                | 2020/10/25                |
| ●    | Spectrum Analyzer            | Agilent      | HTWE0286      | N9020A    | MY50510187 | 2019/10/26                | 2020/10/25                |
| ●    | Radio communication tester   | R&S          | HTWE0287      | CMW500    | 137688-Lv  | 2019/10/26                | 2020/10/25                |
| ●    | Test software                | Tonscend     | N/A           | JS1120    | N/A        | N/A                       | N/A                       |

#### ● Radiated Spurious Emission

| Used | Test Equipment          | Manufacturer       | Equipment No. | Model No.         | Serial No.  | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
|------|-------------------------|--------------------|---------------|-------------------|-------------|---------------------------|---------------------------|
| ●    | Semi-Anechoic Chamber   | Albatross projects | HTWE0122      | SAC-3m-01         | N/A         | 2018/09/27                | 2021/09/26                |
| ●    | Spectrum Analyzer       | R&S                | HTWE0098      | FSP40             | 100597      | 2019/10/26                | 2020/10/25                |
| ●    | Loop Antenna            | R&S                | HTWE0170      | HFH2-Z2           | 100020      | 2018/04/02                | 2021/04/01                |
| ●    | Broadband Horn Antenna  | SCHWARZBECK        | HTWE0103      | BBHA9170          | BBHA9170472 | 2018/10/11                | 2021/10/11                |
| ●    | Ultra-Broadband Antenna | SCHWARZBECK        | HTWE0123      | VULB9163          | 538         | 2018/04/04                | 2021/04/03                |
| ●    | Horn Antenna            | SCHWARZBECK        | HTWE0126      | 9120D             | 1011        | 2020/04/01                | 2023/03/31                |
| ●    | Pre-amplifier           | CD                 | HTWE0071      | PAP-0102          | 12004       | 2019/11/14                | 2020/11/13                |
| ●    | Broadband Preamplifier  | SCHWARZBECK        | HTWE0201      | BBV 9718          | 9718-248    | 2020/05/23                | 2021/05/22                |
| ●    | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-01   | 6m 18GHz S Serisa | N/A         | 2020/05/10                | 2021/05/09                |
| ●    | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-02   | 6m 3GHz RG Serisa | N/A         | 2020/05/10                | 2021/05/09                |
| ●    | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-03   | 6m 3GHz RG Serisa | N/A         | 2020/05/10                | 2021/05/09                |
| ●    | RF Connection Cable     | HUBER+SUHNER       | HTWE0120-04   | 6m 3GHz RG Serisa | N/A         | 2020/05/10                | 2021/05/09                |
| ●    | RF Connection Cable     | HUBER+SUHNER       | HTWE0121-01   | 6m 18GHz S Serisa | N/A         | 2020/05/10                | 2021/05/09                |
| ●    | EMI Test Software       | Audix              | N/A           | E3                | N/A         | N/A                       | N/A                       |

#### ● Auxiliary Equipment

| Used | Test Equipment  | Manufacturer | Equipment No. | Model No. | Serial No. | Last Cal. Date (YY-MM-DD) | Next Cal. Date (YY-MM-DD) |
|------|-----------------|--------------|---------------|-----------|------------|---------------------------|---------------------------|
| ●    | Climate chamber | ESPEC        | HTWE0254      | GPL-2     | N/A        | 2019/10/23                | 2020/10/22                |
| ●    | DC Power Supply | Gwinstek     | HTWE0274      | SPS-2415  | GER835793  | N/A                       | N/A                       |



#### 4.4. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

|              |                       |                               |
|--------------|-----------------------|-------------------------------|
| Voltage      | VN=Nominal Voltage    | DC 3.80V                      |
|              | VL=Lower Voltage      | DC 3.60V                      |
|              | VH=Higher Voltage     | DC 4.35V                      |
| Temperature  | TN=Normal Temperature | 25 °C                         |
|              | Extreme Temperature   | From -30° to + 50° centigrade |
| Humidity     | 30~60 %               |                               |
| Air Pressure | 950-1050 hPa          |                               |

#### 4.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

| Test Items                              | Measurement Uncertainty              | Notes |
|---|--------------------------------------|-------|
| Transmitter power conducted             | 0.51 dB                              | (1)   |
| Transmitter power Radiated              | 2.66dB for <1GHz<br>3.44dB for >1GHz | (1)   |
| Conducted spurious emissions 9kHz~40GHz | 0.51 dB                              | (1)   |
| Radiated spurious emissions             | 2.66dB for <1GHz<br>3.44dB for >1GHz | (1)   |
| Occupied Bandwidth                      | 15Hz for <1GHz<br>70Hz for >1GHz     | (1)   |
| Frequency error                         | 15Hz for <1GHz<br>70Hz for >1GHz     | (1)   |

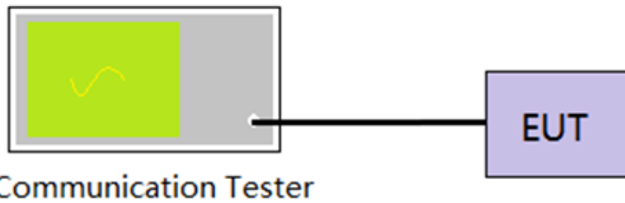
(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## 5. TEST CONDITIONS AND RESULTS

### 5.1. Conducted Output Power

**LIMIT**

N/A

**TEST CONFIGURATION****TEST PROCEDURE**

1. The EUT output port was connected to communication tester.
2. Set EUT at maximum power through communication tester.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS** **Passed**       **Not Applicable**

Refer to appendix A on the section 8 appendix report

## 5.2. Peak-to-Average Ratio

### LIMIT

13dB

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter
2. Set EUT in maximum power output.
3. Center Frequency = Carrier frequency, RBW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed.
  - i. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.
  - ii. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power
6. Record the maximum PAPR level associated with a probability of 0.1%.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

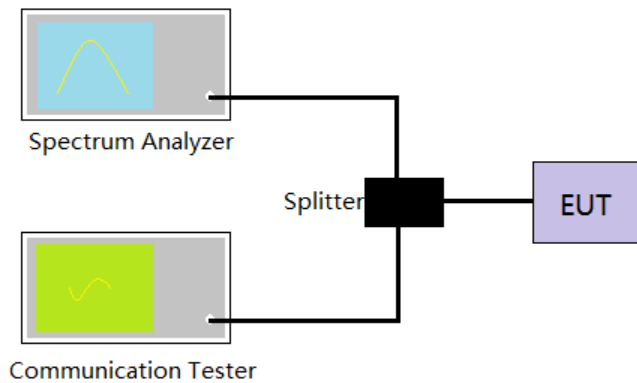
Passed       Not Applicable

Refer to appendix B on the section 8 appendix report

### 5.3. 99% Occupied Bandwidth & 26 dB Bandwidth

**LIMIT**

N/A

**TEST CONFIGURATION****TEST PROCEDURE**

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:  
Center Frequency= Carrier frequency, RBW=1% to 5% of the anticipated OBW, VBW= 3 \* RBW,  
Detector=Peak,  
Trace maximum hold.
4. Record the value of 99% Occupied bandwidth and 26dB bandwidth.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS** **Passed**       **Not Applicable**

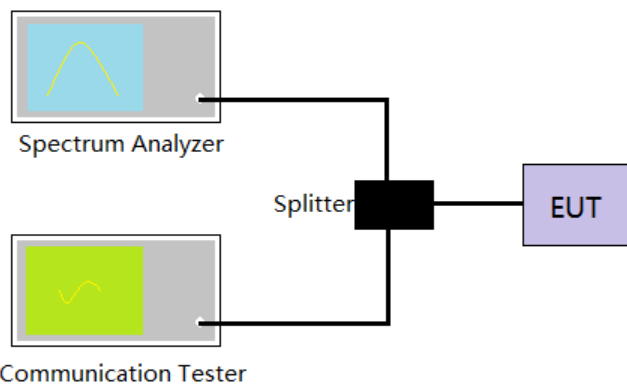
Refer to appendix C on the section 8 appendix report

## 5.4. Band Edge

### LIMIT

- (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \text{ Log}_{10}(f/6.1)$  decibels or  $50 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
- (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter
2. Set EUT in maximum power output.
3. The band edges of low and high channels were measured.
4. Spectrum analyzer setting as follow:  
RBW= no less than 1% of the OBW, VBW =3 \* RBW, Sweep time= Auto
5. Record the test plot.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

Passed       Not Applicable

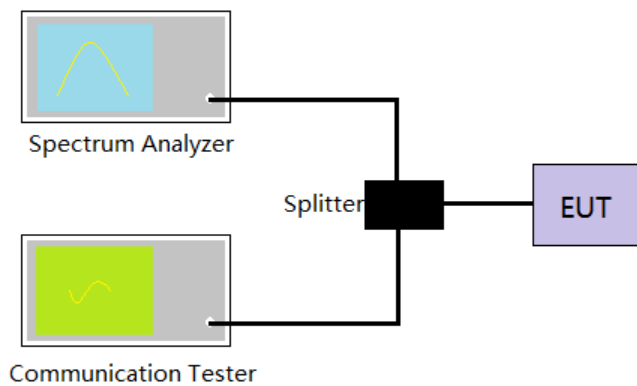
Refer to appendix D on the section 8 appendix report

## 5.5. Conducted Spurious Emissions

### LIMIT

- (3) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \text{ Log}_{10}(f/6.1)$  decibels or  $50 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
- (4) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:  
Below 1GHz, RBW=100KHz, VBW = 300KHz, Detector=Peak, Sweep time= Auto  
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peak, Sweep time= Auto  
Scan frequency range up to 10<sup>th</sup> harmonic.
4. Record the test plot.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

Passed       Not Applicable

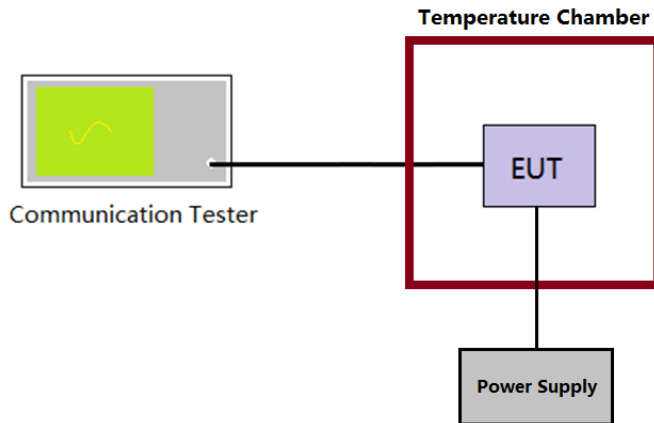
Refer to appendix E on the section 8 appendix report

## 5.6. Frequency stability VS Temperature measurement

### LIMIT

2.5ppm

### TEST CONFIGURATION



### TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber.
4. Turn EUT off and set the chamber temperature to  $-30^{\circ}\text{C}$ . After the temperature stabilized for approximately 30 minutes recorded the frequency.
5. Repeat step 4 measure with  $10^{\circ}\text{C}$  increased per stage until the highest temperature of  $+50^{\circ}\text{C}$  reached.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

Passed       Not Applicable

Refer to appendix F on the section 8 appendix report

## 5.7. Frequency stability VS Voltage measurement

### LIMIT

2.5ppm

### TEST CONFIGURATION



### TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber at 25°C
4. The power supply voltage to the EUT was varied  $\pm 15\%$  of the nominal value measured at the input to the EUT
5. Record the maximum frequency change.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

Passed       Not Applicable

Refer to appendix F on the section 8 appendix report

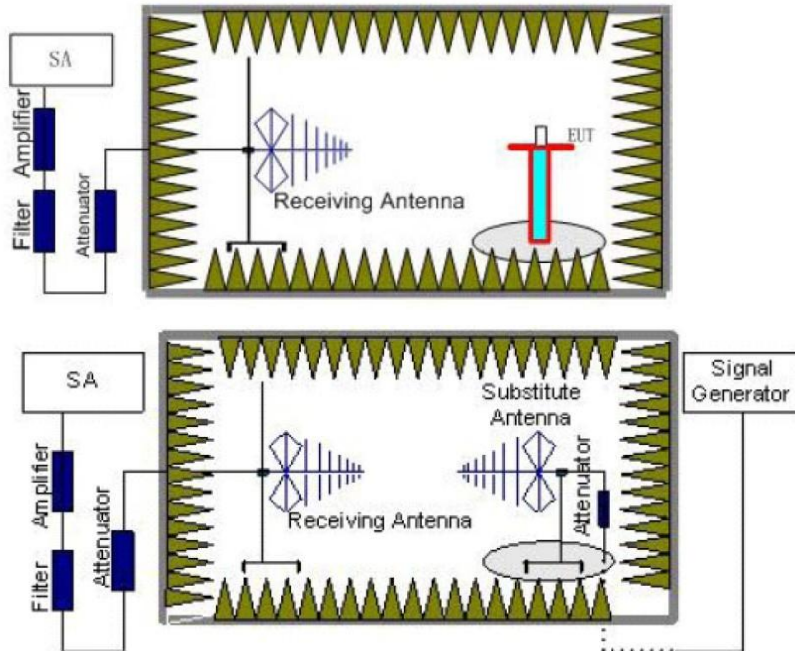


## 5.8. ERP

### LIMIT

LTE Band 26: 100W(50.00dBm) ERP

### TEST CONFIGURATION



### TEST PROCEDURE

1. Place the EUT in the center of the turntable.
  - a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
  - b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
 

Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto

Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
  - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.

7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
  - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
  - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
  - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:  
$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$
where  
 $P_e$  = equivalent emission power in dBm  
 $P_s$  = source (signal generator) power in dBm  
*NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.*
13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:  
$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$
If necessary, the antenna gain can be calculated from calibrated antenna factor information
14. Provide the complete measurement results as a part of the test report.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS**

**Passed**       **Not Applicable**

| LTE Band 26-1.4MHz |         |           |            |             |        |
|--------------------|---------|-----------|------------|-------------|--------|
| Modulation         | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|                    |         | Vertical  | Horizontal |             |        |
| QPSK               | Low     | 20.89     | 18.19      | <50.00      | PASS   |
|                    | Mid     | 21.75     | 19.02      |             |        |
|                    | High    | 20.49     | 18.09      |             |        |
| 16QAM              | Low     | 20.88     | 18.18      |             |        |
|                    | Mid     | 21.74     | 19.04      |             |        |
|                    | High    | 20.48     | 18.08      |             |        |

| LTE Band 26-3MHz |         |           |            |             |        |
|------------------|---------|-----------|------------|-------------|--------|
| Modulation       | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|                  |         | Vertical  | Horizontal |             |        |
| QPSK             | Low     | 20.89     | 18.20      | <50.00      | PASS   |
|                  | Mid     | 21.76     | 19.01      |             |        |
|                  | High    | 20.50     | 18.11      |             |        |
| 16QAM            | Low     | 20.87     | 18.17      |             |        |
|                  | Mid     | 21.72     | 19.02      |             |        |
|                  | High    | 20.46     | 18.08      |             |        |

| LTE Band 26-5MHz |         |           |            |             |        |
|------------------|---------|-----------|------------|-------------|--------|
| Modulation       | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|                  |         | Vertical  | Horizontal |             |        |
| QPSK             | Low     | 20.88     | 18.18      | <50.00      | PASS   |
|                  | Mid     | 21.74     | 19.03      |             |        |
|                  | High    | 20.49     | 18.12      |             |        |
| 16QAM            | Low     | 20.89     | 18.22      |             |        |
|                  | Mid     | 21.73     | 19.01      |             |        |
|                  | High    | 20.46     | 18.09      |             |        |

| LTE Band 26-10MHz |         |           |            |             |        |
|-------------------|---------|-----------|------------|-------------|--------|
| Modulation        | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|                   |         | Vertical  | Horizontal |             |        |
| QPSK              | Mid     | 21.76     | 19.03      | <50.00      | PASS   |
| 16QAM             | Mid     | 21.76     | 19.04      |             | PASS   |

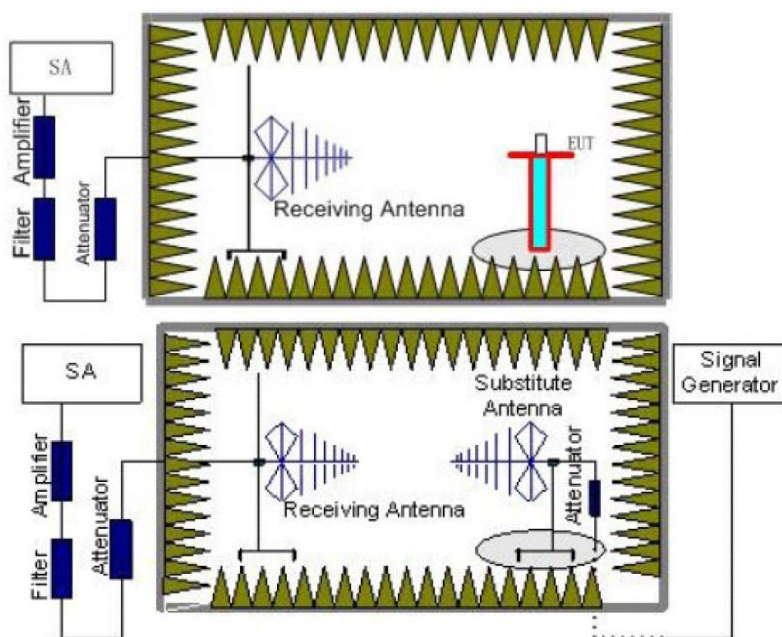
| LTE Band 26-15MHz |         |           |            |             |        |
|-------------------|---------|-----------|------------|-------------|--------|
| Modulation        | Channel | ERP (dBm) |            | Limit (dBm) | Result |
|                   |         | Vertical  | Horizontal |             |        |
| QPSK              | Low     | 20.88     | 18.16      | <50.00      | PASS   |
| 16QAM             | Low     | 20.89     | 18.19      |             | PASS   |

## 5.9. Radiated Spurious Emission

### LIMIT

- (5) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \text{ Log}_{10}(f/6.1)$  decibels or  $50 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
- (6) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

### TEST CONFIGURATION



### TEST PROCEDURE

1. Place the EUT in the center of the turntable.
  - a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
  - b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
  - Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto
  - Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
  - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.

- b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
  - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
  7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
  8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
  9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
  10. For each emission that was detected and measured in the initial test
    - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
    - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
    - c) Record the output power level of the signal generator when equivalence is achieved in step b).
  11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
  12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:  
$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$
where  
 $P_e$  = equivalent emission power in dBm  
 $P_s$  = source (signal generator) power in dBm  
*NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.*
  13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:  
$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$
If necessary, the antenna gain can be calculated from calibrated antenna factor information
  14. Provide the complete measurement results as a part of the test report.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS**

**Passed**       **Not Applicable**

Note: only show the worse case for QPSK modulation.

| LTE Band 26-1.4MHz |                 |                   |             |             |        |
|--------------------|-----------------|-------------------|-------------|-------------|--------|
| Channel            | Frequency (MHz) | Spurious Emission |             | Limit (dBm) | Result |
|                    |                 | Polarization      | Level (dBm) |             |        |
| Low                | 1629.4          | Vertical          | -30.27      | <-13.00     | Pass   |
|                    | 2444.1          | V                 | -39.01      |             |        |
|                    | 3258.8          | V                 | -40.71      |             |        |
|                    | 1629.4          | Horizontal        | -35.25      | <-13.00     | Pass   |
|                    | 2444.1          | H                 | -42.53      |             |        |
|                    | 3258.8          | H                 | -42.26      |             |        |
| Mid                | 1638            | Vertical          | -30.23      | <-13.00     | Pass   |
|                    | 2457            | V                 | -38.92      |             |        |
|                    | 3276            | V                 | -40.64      |             |        |
|                    | 1638            | Horizontal        | -35.19      | <-13.00     | Pass   |
|                    | 2457            | H                 | -42.41      |             |        |
|                    | 3276            | H                 | -42.13      |             |        |
| High               | 1646.6          | Vertical          | -30.17      | <-13.00     | Pass   |
|                    | 2469.9          | V                 | -38.80      |             |        |
|                    | 3293.2          | V                 | -40.54      |             |        |
|                    | 1646.6          | Horizontal        | -35.13      | <-13.00     | Pass   |
|                    | 2469.9          | H                 | -42.20      |             |        |
|                    | 3293.2          | H                 | -41.93      |             |        |

| LTE Band 26-3MHz |                 |                   |             |             |        |
|------------------|-----------------|-------------------|-------------|-------------|--------|
| Channel          | Frequency (MHz) | Spurious Emission |             | Limit (dBm) | Result |
|                  |                 | Polarization      | Level (dBm) |             |        |
| Low              | 1631            | Vertical          | -30.12      | <-13.00     | Pass   |
|                  | 2446.5          | V                 | -38.73      |             |        |
|                  | 3262            | V                 | -40.49      |             |        |
|                  | 1631            | Horizontal        | -35.10      | <-13.00     | Pass   |
|                  | 2446.5          | H                 | -42.13      |             |        |
|                  | 3262            | H                 | -41.87      |             |        |
| Mid              | 1638            | Vertical          | -30.20      | <-13.00     | Pass   |
|                  | 2457            | V                 | -38.85      |             |        |
|                  | 3276            | V                 | -40.59      |             |        |
|                  | 1638            | Horizontal        | -35.15      | <-13.00     | Pass   |
|                  | 2457            | H                 | -42.32      |             |        |
|                  | 3276            | H                 | -42.04      |             |        |
| High             | 1645            | Vertical          | -30.16      | <-13.00     | Pass   |
|                  | 2467.5          | V                 | -38.77      |             |        |
|                  | 3290            | V                 | -40.52      |             |        |
|                  | 1645            | Horizontal        | -35.11      | <-13.00     | Pass   |
|                  | 2467.5          | H                 | -42.17      |             |        |
|                  | 3290            | H                 | -41.90      |             |        |

| LTE Band 26-5MHz |                 |                   |             |             |        |
|------------------|-----------------|-------------------|-------------|-------------|--------|
| Channel          | Frequency (MHz) | Spurious Emission |             | Limit (dBm) | Result |
|                  |                 | Polarization      | Level (dBm) |             |        |
| Low              | 1633            | Vertical          | -30.06      | <-13.00     | Pass   |
|                  | 2449.5          | V                 | -38.63      |             |        |
|                  | 3266            | V                 | -40.43      |             |        |
|                  | 1633            | Horizontal        | -35.05      | <-13.00     | Pass   |
|                  | 2449.5          | H                 | -42.02      |             |        |
|                  | 3302            | H                 | -41.77      |             |        |
| Mid              | 1638            | Vertical          | -30.00      | <-13.00     | Pass   |
|                  | 2457            | V                 | -38.50      |             |        |
|                  | 3276            | V                 | -40.32      |             |        |
|                  | 1638            | Horizontal        | -34.97      | <-13.00     | Pass   |
|                  | 2457            | H                 | -41.85      |             |        |
|                  | 3276            | H                 | -41.59      |             |        |
| High             | 1643            | Vertical          | -29.92      | <-13.00     | Pass   |
|                  | 2464.5          | V                 | -38.33      |             |        |
|                  | 3286            | V                 | -40.18      |             |        |
|                  | 1643            | Horizontal        | -34.89      | <-13.00     | Pass   |
|                  | 2464.5          | H                 | -41.70      |             |        |
|                  | 3286            | H                 | -41.47      |             |        |

| LTE Band 26-10MHz |                 |                   |             |             |        |
|-------------------|-----------------|-------------------|-------------|-------------|--------|
| Channel           | Frequency (MHz) | Spurious Emission |             | Limit (dBm) | Result |
|                   |                 | Polarization      | Level (dBm) |             |        |
| Mid               | 1638            | Vertical          | -29.80      | <-13.00     | Pass   |
|                   | 2457            | V                 | -38.12      |             |        |
|                   | 3276            | V                 | -39.99      |             |        |
|                   | 1638            | Horizontal        | -34.81      | <-13.00     | Pass   |
|                   | 2457            | H                 | -41.52      |             |        |
|                   | 3276            | H                 | -41.33      |             |        |

| LTE Band 26-15MHz |                 |                   |             |             |        |
|-------------------|-----------------|-------------------|-------------|-------------|--------|
| Channel           | Frequency (MHz) | Spurious Emission |             | Limit (dBm) | Result |
|                   |                 | Polarization      | Level (dBm) |             |        |
| Low               | 1643            | Vertical          | -29.65      | <-13.00     | Pass   |
|                   | 2464.5          | V                 | -37.95      |             |        |
|                   | 3286            | V                 | -39.82      |             |        |
|                   | 1643            | Horizontal        | -34.68      | <-13.00     | Pass   |
|                   | 2464.5          | H                 | -41.36      |             |        |
|                   | 3286            | H                 | -41.18      |             |        |

## Remark:

1. Remark"---" means that the emission level is too low to be measured
2. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

## **6. TEST SETUP PHOTOS OF THE EUT**

Refere to the test report No.: CHTEW20080142.

## **7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT**

Refere to the test report No.: CHTEW20080142.

## **8. APPENDIX REPORT**